The effect of climate on tourist comfort in Sawa Lake

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Introduction :

Climate is one of the variables that influence human health and comfort, and studies show that regions with slight temperature difference encourage people to overcome their laziness and lethargy and engage in inactive behaviour. Moreover, the changing climate requires joint physical and mental activity.

Some studies indicate a relationship between efficiency in completing employment or engaging in tourism activities and temperature. Efficiency decreases by 57 percent as the temperature drops below zero, and efficiency approaches 25 percent as the temperature drops below zero (from 10 to 10 degrees). When it comes to work or activity, when the level of work or activity falls to zero percent, the level of work or activity drops to zero percent and when the temperature is 40°C and above 30°C, human efficiency is 75 percent, but when the temperature is 20°C, the human efficiency is 100 percent.

As a result, the temperature has an effect, since a temperature rise from 10 ° C to 20 ° C does not have any effect on a person's mood, but a one degree rise in temperature above 40 ° C causes it to rise in summer. In the light of the foregoing, what is the effect of climate on the efficiency and activities of tourists, including tourism activity, with rising temperatures?

The first topic Theoretical framework

Research problem:

The problem of researching the Sawa Lake site is that it is one of the most important tourist sites, and it is distinguished from other lakes by its local and international fame. However, due to the lack of public services, tourist services and neglect, investment in this lake has not been made in a manner commensurate with the value of this impact. Therefore, the research problem can be formulated as follows (What is the role of climate impact on tourist comfort in Sawa Lake?)

Research hypothesis:

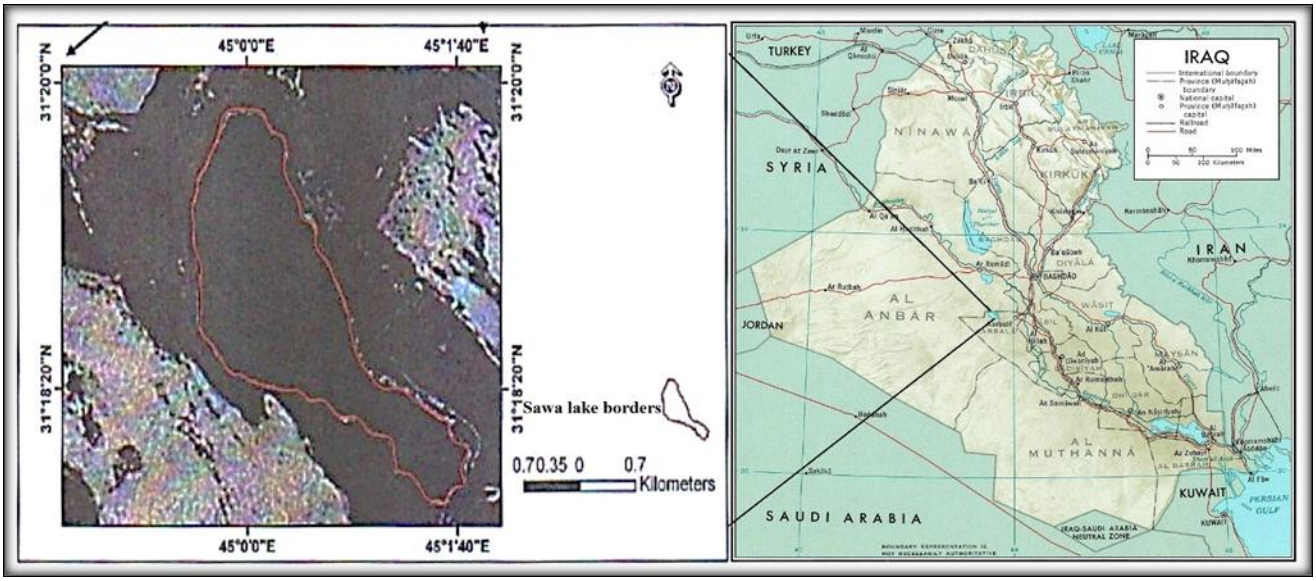
Since the research problem is represented in the following figure (What is the role of climate impact on the comfort of tourists in Sawa Lake?), Therefore, a hypothesis can be put in front of the main problem, which can be answered as follows (the effect of climate on the comfort of the tourist in Sawa Lake)

Boundaries of the study area and area:

Lake Sawa is a closed salt lake in the Iraqi governorate of Muthanna, adjacent to the Euphrates River and 23 kilometers west of Samawah.([1]) As shown in Map No. (1), as for its astronomical location, the search area is limited in terms of latitude (31.7 - 31.20) north and longitude (44.59 - 45.11) east

The shape of the lake is an uneven oval in the east akin to a pear, rising about 18-20 meters above sea level, or about 6 meters, above adjacent areas ([2]). It has an area of 12.5 square kilometers, a maximum length of 4.75 km, and a maximum width of 1.75 km. Sawa Lake for the year 2020 using the climatic data of the Samawah Climatic Station for the period (2010-2020).

Map (1) The location of the study area



Source // Ministry of Water Resources, Directorate of Public Survey, Iraq's administrative map at a scale of 1:1000000, 2001.

research importance:

The study is necessary for the following reasons:-

1- Lake Sawa is a natural phenomenon that, due to its dry location, needs research and explanation.

2- Lake Sawa is considered one of the most important tourist sites in Iraq, despite its complete neglect.

3- In order to protect natural and environmental resources for future generations, tourism planning and development at all levels and forms increases international and Arab interest.

Research goal:

1- The importance of the research is to know the extent of the influence of climatic elements on the comfort of the tourist in Sawa Lake.

2- Knowing the months that are comfortable for the tourist and the months that are uncomfortable.

[1] -https://www.wikiwand.com/en/Sawa Lake

[2] - Zainab and Nas Khudair Al-Hasnawi, Geomorphological analysis of the origin and evolution of Lake Sawa and its evaluation for the purposes of tourism development projects, Journal of Geographical Research, No. 22, University of Kufa - College of Education for Girls, 2015, p. 335.

3- Getting to know the qualifications of tourism development in Sawa Lake, in addition to the obstacles that stand in the way of development, and working on the possibility of suggesting some solutions to alleviate these obstacles.

Research Methodology:

The researcher followed the method of statistical analysis, using the data of the climatic elements of the weather station in Samawah, and for the supporting objectives of the analysis that the researcher wanted to structure his research, the researcher relied on quantitative analysis and some statistical indicators as a supportive method such as relying on and the wind cooling guide to determine the favorable months and months Uncomfortable for the tourist.

Previous studies:

Despite the numerous studies that focused on the problem of climate change, the theoretical framework, especially in the areas of its relation to population distribution, transportation, different types of sectors and the degree of its impact, has not changed to a large extent. Unfortunately, the researcher believes that the topic of the relationship between climate and the tourism industry has not received much attention, which indicates the importance of this research because it will shed light on this relationship in a different way from the above-mentioned fields, providing a new field of research. light on this relationship.

Research Structure:

The structure of the research was divided into five sections, the first section included the theoretical framework of the research, the second section dealt with the main concepts of tourism and its purposes and the tourism climate, while the third topic came to show the relationship between climate as a raw material in the tourism industry, and the climatic equation of the fourth section was devoted. As for the fifth topic, it included calculating the impact of climate on the comfort of the tourist according to the applied equations, and the research concluded with conclusions and suggestions.

The second topic
The main concepts of tourism, its purposes and tourism climate

Tourism

The idea of tourism has been addressed by many scholars and international organizations, and these concepts were developed depending on the scientific background of the researcher. The movement of individuals from one region to another or from one country to another for a period of not less than 24 hours and not more than a year, the first being the term tourism. A geographical phenomenon based on the natural environment, its economic structure, its human motive, and its leader is psychological and mental pleasure([3])Thus, it transports individuals from one region to another or from one country to another for a period of not less than 24 hours and not more than a year, the first of which is Tourism Domestic tourism comes first, followed by International Tourism.

[3] - Hassan Abdel Qader, Geography of Tourism in Jordan, Journal of Jordanian University Studies, Volume 2, No. 2 1975, p. 37.

A Tourist is any person who travels for a period of not less than 24 hours and not more than one year from his previous place of residence to any area for the purpose of tourism other than for business.([4])

Purposes Tourist

Climate in all its forms is one of the most important variables in the formation and growth of tourism and entertainment, whether locally or internationally. Determining the spatial and temporal dimension of travel and accommodation relations first, then the extent to which natural tourism sources are used secondly, whereby all natural manifestations (topography, surface water resources, eyes, waterfalls, waterfalls, forests) can be developed and transformed into tourist attractions under the climate umbrella.

According to this climatic impact, tourism has grown in the countries of the world as a climatic tourism because this activity represents the economic return and the provision of job opportunities for a large number of its residents, especially in developing countries such as Iraq. As a result, it is necessary to conduct a study of the spatiotemporal relationship between climatic features, tourism, and recreation, as well as the impact of this on the development of the reality of tourism and recreation, as well as to determine the nature of the appropriate tourism climate.([5])

The tourism purposes are many and varied. However, in the course of our study, we will focus on direct and indirect climate-dependent tourism objectives, which include the following ([6]) :-

First: the tourist purposes that depend directly on the climate.

The following purposes are included in this category:

1- Beach tourism.

Which is founded and operates on the basis of five basic elements:

A - solar radiation

b- air and water temperature

The purity of the water.

d- The sandy beach.

c- Availability of access and human habitation options.

2- Tourism centered around water sports

It is necessary to establish and operate the following:

A - Areas with a lot of open water and a great depth.

b- Equipment for sailing boats and others, as well as fishing equipment.

The environment is warmer.

d- Ease of access and facilities for accommodation. This species can be found in lakes, reservoirs, rivers and other bodies of water.

[4] - World Tourism Organization, November, 1974.

[5] - Ali Sahib Talib Al-Moussawi, The spatio-temporal relationship between climatic characteristics, tourism and entertainment, Proceedings of the First International Scientific Conference of the University's College of Human Studies, 19-20 April / 2016, p.1.

[6] - Adel Saeed Al-Rawi and Qusai Abdul Majeed Al-Samarrai, Applied Climate, Ministry of Higher Education and Scientific Research, University of Baghdad, 1991, pp. 203-204.

3- Tourism based on the natural environment
Which depends on the topography of the natural environment and requires:
A - The extent of the clear vision required
clear sky
-Sun rays
B- Diverse landscapes of different terrain and the natural and agricultural vegetation it covers
C- Tourist routes are varied and built primarily for the purpose of serving tourism.
This does not mean that all the elements of direct tourist purposes are currently available in the study area, but that some of them are available and the possibility of developing and developing them in a way that serves the direct tourist purposes.

Second: the tourist purposes for which the climate is not directly related

They are divided into three categories:
1- Tourism based on history.
2- Tourism for religious purposes.
3- Tourism for cultural and political reasons.
By studying or considering these many tourism goals that are directly or indirectly related to the climate, it becomes clear that the primary goal of tourism is to enjoy the climate, whether for health, medical, historical, religious, cultural, or other reasons. In summer, tourists look for tourist destinations with a sunny and temperate environment, while in winter, the warm and sunny location is the main attraction. As a result, the formation of tourist facilities or resorts is a consequence of climatic conditions that attract both domestic and foreign tourists.

Climate and tourism climate

Climatology is generally concerned with researching and analyzing the average weather condition, as well as the average physical condition of the atmosphere over a certain period of time, with statistical differences in time and place.([7])
Climate describes the average state of an area's atmosphere over a long period of time (about 30 to 35 years). ([8])

Tourist climate

It is the climate that gives tourists warm, humid and sunny winters and cool and sunny summers, and it is this environment that brings comfort.([9])
Through a brief review of the tourist climate, the concept of human comfort must be addressed ([10]) ,And comfort is the ability of the human body to perform its normal activities in an atmosphere consistent with these events without having a negative impact as many people. Affected by high or low temperature, humidity, solar radiation and wind, this concept varies from person to person, since these variables are interrelated, none of them can be a proper indicator of how comfortable one feels

[7] - Oliver, John. Climatology "Selected Applications, John Wiley and Sons" New York,1981.
[8] - Ali Hassan Mousa, Climate Geography, Damascus University, Faculty of Arts for Human Sciences, 2005.
[9] - A.S.AL Rawi, "The Tourist industry in Iraq, A Geographical case study and its character" problem and potential, Ph.D. these, Glasgon.pp.203, 1982.
[10] - Terjung, Warner. "Annual physic climatic stresses and Regimes in the united states in climate in Reviw" Edited by mcboyle, Houghton Miffin Co. 1973. pp 119-128.

The third topic

The relationship between climate and tourism

Elements of the tourist climate: A tourist attraction is the pleasant atmosphere in the temperatures, as visitors look for sunny coasts to spend the weekend, or enhance it to meet the requirements of tourists. (The British) to the Mediterranean region in order to expose themselves to strong sunlight in the hope of changing the color of their skin, and the following are the elements of the tourist climate:

1- Solar radiation:

Solar radiation has a variety of effects, independent of temperature, including:

A- The human body absorbs infrared rays directly or through his clothes, which raises his internal temperature. The person means shade areas such as forests and trees, or where the rays are in a cold climate, and the concentration of these rays may cause them to occur. Blindness, headache and other symptoms reduce human comfort.

B - Ultraviolet rays are necessary for the human body to produce vitamin D, which is an essential element in the formation and strengthening of bones. Also, if these rays enter the body easily and their access is not obstructed by ozone gas O3, which absorbs most of them, they play a role in infecting human skin with ulcers and cancer, and harming the eyes with many diseases.([11])

2- Temperature:

The minimum and maximum temperature forces the human body to return to its thermal equilibrium, which is directly proportional to the amount of heat it receives or loses in relation to the ambient temperature.

The chemical and physical activities of man are required to restore thermal equilibrium , as a result, the optimum air temperature is very close to the core human temperature. 37°C, disease free, and as a result, a location that provides air heat. In terms of exposure to sunlight and moisture. The health site most suitable for human existence, which is referred to as health resorts, a form of tourism, and its basic conditions, is closer to this degree ([12])

Because the regions are very cold and high heat repels tourists, they are temperate regions that provide humans with a sense of physical and psychological comfort, and because the temperature between (18-35 degrees Celsius) is the optimum temperature for human comfort and various activities, and these temperatures are not available throughout the year except for the season Summer, tropical highlands, with elevations ranging from 2000 to 5000 feet (500-2000), and temperatures above (28°C) and below (15°C) are a deterrent to tourism. The tourist feels the heat generated in his body as a result of the metabolic process, which increases with movement, and the disability increases with the increase in thermal extremism, especially the intensity in its height above the average, which is thermally unsuitable for tourism, which the tourist feels and results from the heat generated in their bodies as a result of the metabolic process that It increases with movement.

It was found that a temperature of no more than (25 ° C) and a relative humidity of not more than (60 percent) provide the optimum tourist environment, while the temperature (18-25 ° C) is the best for human comfort. activity, and that this thermal limit is not exceeded. It is accessible all year round,

[11] - Adel Saeed Al-Rawi and Qusai Abdul Majeed Al-Samarrai, Op.Cit, pg. 205.

[12] - Adel Saeed Al-Rawi and Qusai Abdul Majeed Al-Samarrai, Ibid, pp. 205-206.

except for the intertropical highlands (500-2000 m), where the lower parts of the tropics, especially the tropics, are considered thermally unsuitable because the average daily temperature constantly exceeds 35 °C (25 m) .

Almost all climate experts agree that the maximum for human comfort is 25 degrees Celsius, while the minimum varies depending on human habitat, activity, type of food and drink, regardless of clothing, and ranges between 10 and 15 degrees Celsius.([13])

3- Air purity:

Air purity is one of the most important variables that affect human health. Clean air, which is low in carbon dioxide and pollutants, is still one of the most important aspects of the tourist attraction process, and it continues to play a major role in deciding where resorts and mountain resorts are located in the first place. Due to the element of height, the air is free from dust. Because it is carbon dioxide, it slows down the process of absorbing heat in the air. This explains why summer resorts and hiking areas focus on the middle mountain slopes between valleys and mountain peaks, so valleys have become as it is known a reservoir of cold air at night or in winter, and warm air during the day and summer, which affects the various centers of atmospheric pressure, and thus the daily air movement arises Between the mountaintops and the belly of the valleys through the mid-rise slopes, these make good sites for air drainage.

4- Visibility:

It was previously said that after staring at the horizon, the extent of vision is determined by the purity of the sky, which is determined by the proportion of clouds and sunlight, and the purity of the air free of dust and fog. This element plays an important role in landscape and landscape-based tourism, both in and out of cities.

5- Snow:

The development of winter sports centers depends largely on snowfall and snow accumulation in order to enable various forms of winter sports, the most famous of which is snowboarding. Mechanism Whatever the environmental elements to create a sports facility, the site must have a moderate climate and reasonable wind speed, both of which are necessary in winter sports and winter tourism ([14])

Wind and its effects on tourism:

Wind characteristics are one of the climatic variables affecting tourism, as the wind speed of less than 5 m / s is one of the tourist attractions, as it reduces the person's sense of excessive heat and when combined with moisture, it provides a cooling effect. The absence of wind movement leads to direct heat transfer to the body Human, so the ideal blowing of air is when it is in the form of a breeze at a speed of (3.0 - 5.1) m/s), or in the form of a light breeze (1.1-3.3 m/s), and creates a light breeze between (4.3-5.1 m/s) d).

The sea wind speed on the shores of oceans and lakes, as well as on the banks of large rivers, does not significantly enhance the air movement (5 m/s) required for tourist sites. At the same time, wind is a climatic component and a factor affecting tourists. While high velocity winds aid in the

[13] - Adel Saeed Al-Rawi and Qusai Abdul Majeed Al-Samarrai, Ibid, pp. 17-19.
[14] - Adel Saeed Al-Rawi and Qusai Abdul Majeed Al-Samarrai, Op.Cit, pp. 206-207.

development of sandy stretches or help in their formation when they sweep away huge amounts of sand, winds also carry sand particles and bits of rock from desert erosion processes. Elements of tourist attractions in all countries and regions of the tourist world, where wind speeds increase above 17 m / s. It will hinder any tourist activity, and winds with high speeds between (10-17 m/s) reduce activity.

Air humidity and its effects on tourism:

Relative humidity is one of the climatic elements of great importance in tourism because of its effective role in human comfort and activities, and its impact is clear in determining the actual value of heat, as the relationship between them is very strong, and it is difficult to determine it. Separate them in terms of their biological effect on humans, as well as climatic.It depends on the treatment of patients with various diseases, as doctors advise many patients to first go to areas where the air is clean, and the air humidity is low. Second, both are usually accessible in mountainous areas, especially those far from bodies of water ([15]).

According to studies, the appropriate air humidity, which ranges between (40-60%) is the most beneficial for the human body, but if it exceeds (70%) during the cold or heat season([16])A person will feel cold in winter and in summer his sense of warmth increases with the increase in temperature and humidity on his body, especially if the temperature is close to freezing (0-5 ° C), that is, if the absolute humidity is high due to the increase in water. Vapor pressure and decreased sweating values as a result, firstly, the cooling of the surface of the body is diminished. Second: If the relative humidity drops to less than (40%) with an increase in temperature, as is the case in dry places in summer, to less than (10%), the weather will be hot, but not burning, and the weather will be hot. Less annoying. The weather is hot and humid, but the combination of low relative humidity and a temperature drop below 5°C will make the weather conditions cold and unpleasant.

The fourth topic
Climatic characteristics of Lake Sawa

To study the climatic characteristics of Lake Sawa, the weather station in Samawa was relied on, as follows:

1- Temperature:

Table (1) shows that the annual average of the normal temperature reached (25.61) degrees Celsius, with a limit of (32.61) degrees Celsius as the maximum temperature, while the annual average of the minimum temperature reached (18.63) degrees Celsius.

During the months, the lowest monthly average reached (11.75), (17.2) and (6.3) degrees Celsius, respectively, for the normal, maximum and minimum temperature, during January, while the highest monthly average for temperature reached (37) and (45.4) And (29.6) degrees Celsius, respectively, for the normal, maximum and minimum temperatures during the month of July.

[15] - Ali Sahib Talib Al-Moussawi, Op.Cit, pp. 23, 24, 26.

[16] - Qasim Sweih Halbot Al-Aboudi, Characteristics of the Tourist Climate in the Cities of Najaf and Karbala, Master's Thesis (unpublished), College of Arts, University of Kufa, 2014, p. 51.

Table (1)

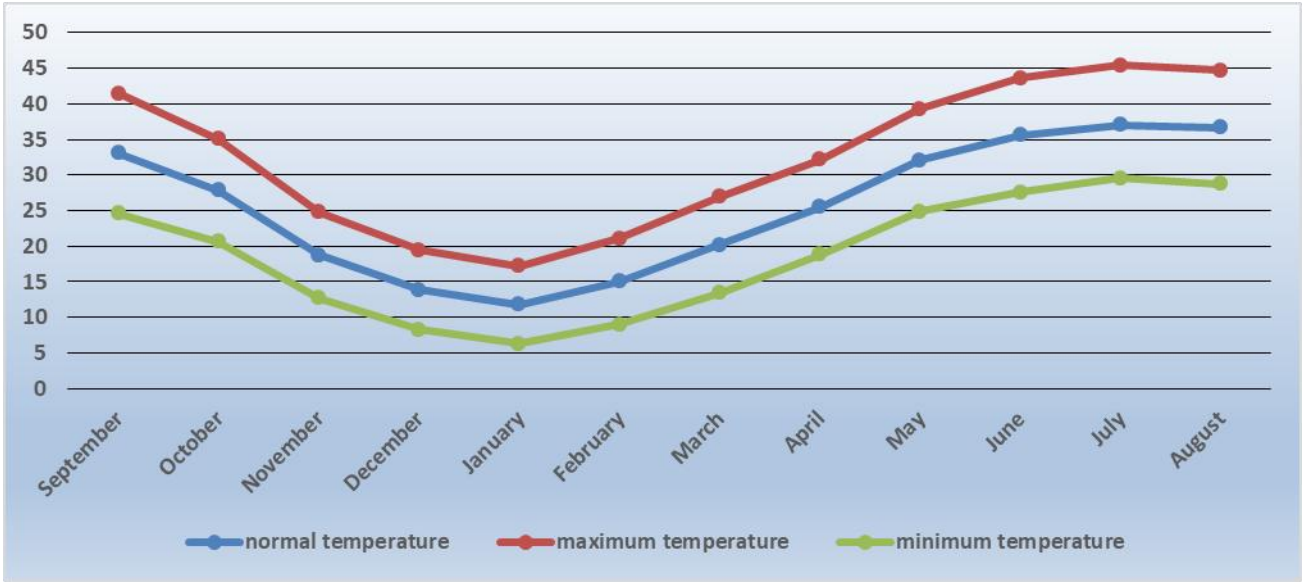
The monthly average of the normal, maximum and minimum temperature degrees Celsius for the Samawa station for the period (2010-2020)

Month	Normal temperature	maximum temperature	minimum temperature
September	33.05	41.5	24.6
October	27.85	35.1	20.6
November	18.75	24.8	12.7
December	13.9	19.5	8.3
January	11.75	17.2	6.3
February	15.05	21.1	9
March	20.15	26.9	13.4
April	25.5	32.2	18.8
May	32.1	39.3	24.9
June	35.6	43.6	27.6
July	37	45.4	29.6
August	36.7	44.7	28.7
annual rate	25.61	32.61	18.63

Source // Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Division, unpublished data.

Figure (1)

The monthly average of the normal, maximum and minimum temperature degrees Celsius for the Samawa station for the period (2010-2020)



Source/Table (1)

2- Wind speed:

Table (2) and Figure (2) show that the highest monthly average wind speed was recorded during the month of June, reaching (4.3) m/s, while the lowest monthly average wind speed reached (2.7) m/s during the month. November. As for the annual rate, it was 3.48 m/s.

Table (2)

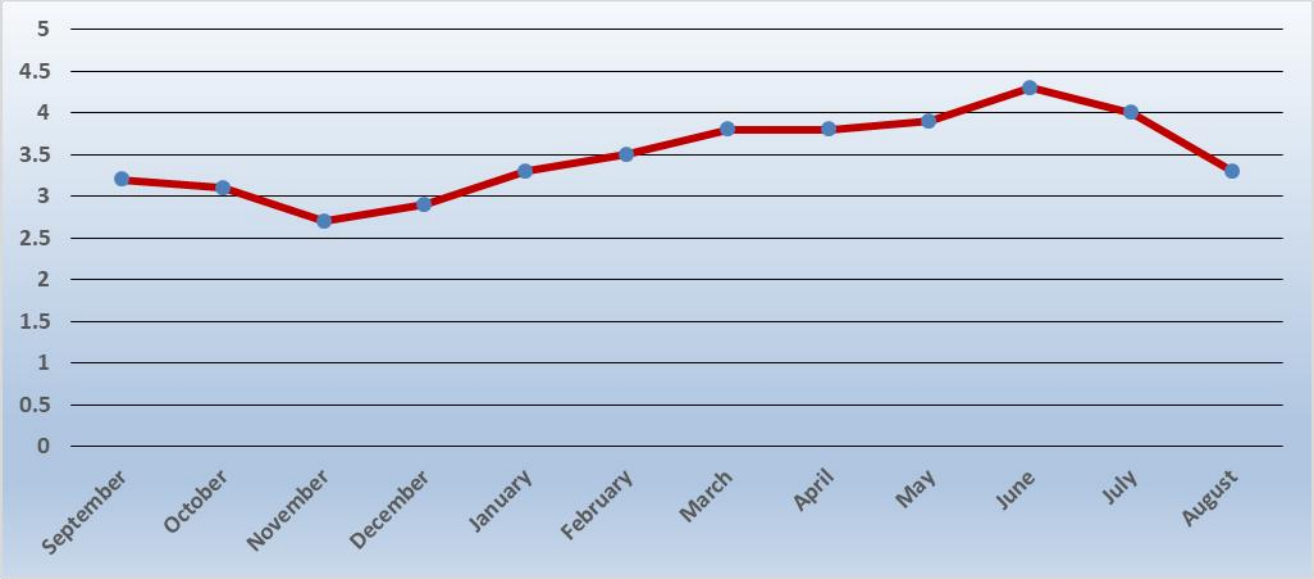
The monthly average wind speed m/s for the Samawa station for the period (2010-2020)

Month	wind speed m/s	Month	wind speed m/s
September	3.2	March	3.8
October	3.1	April	3.8
November	2.7	May	3.9
December	2.9	June	4.3
January	3.3	July	4
February	3.5	August	3.3

Source // Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Division, unpublished data.

Figure (1)

The monthly average wind speed m/s for the Samawa station for the period (2010-2020)



Source/Table (2)

3- Relative humidity:

It is evident from Table (3) and Figure (3) that the highest monthly rate of relative humidity reached 55.7% during January, while the lowest rate reached 17.5% during July, while the annual average reached (33.12) %).

Table (3)

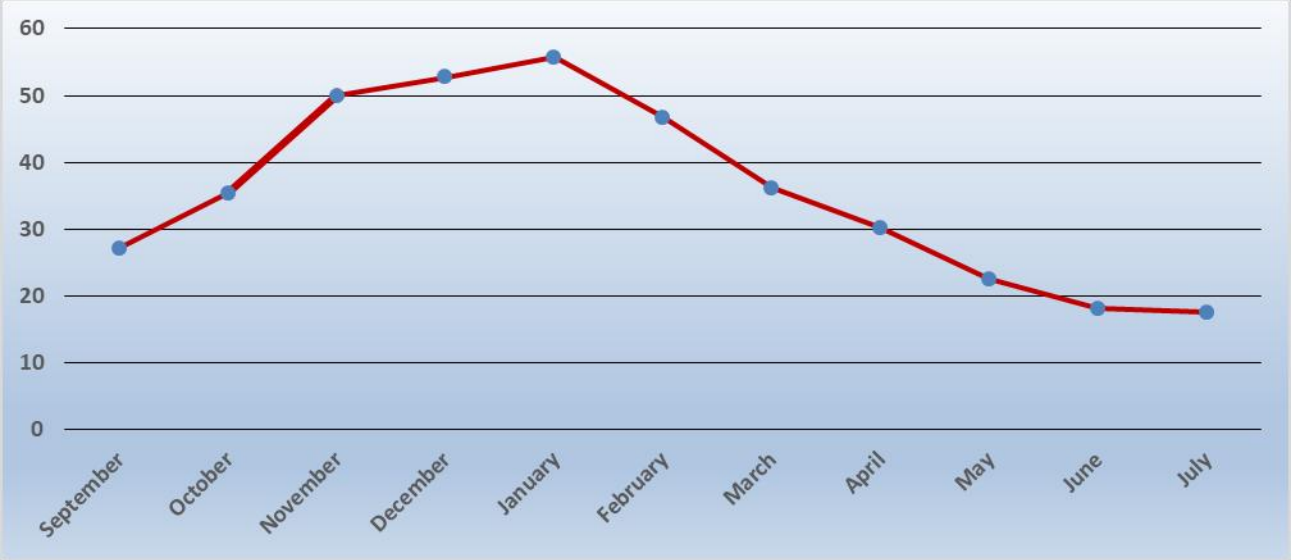
Relative humidity (%) for Samawa station for the period (2010-2020)

Month	Relative Humidity	Month	Relative Humidity
September	27.1	March	36.1
October	35.4	April	30.2
November	50	May	22.5
December	52.7	June	18.1
January	55.7	July	17.5
February	46.7	August	19

Source // Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Water Signals Department, unpublished data.

shape(3)

Relative humidity (%) for Samawa station for the period (2010-2020)



Source / Table (3)

4- Evaporation:

Table (4) and Figure (4) show that the highest monthly rate of evaporation reached (583.1) mm during the month of July, while the lowest rate reached (82.2) mm during January, and the annual rate reached (281.68) mm .

table(4)

Monthly rates of evaporation (mm) for Samawa station for the period (2010-2020)

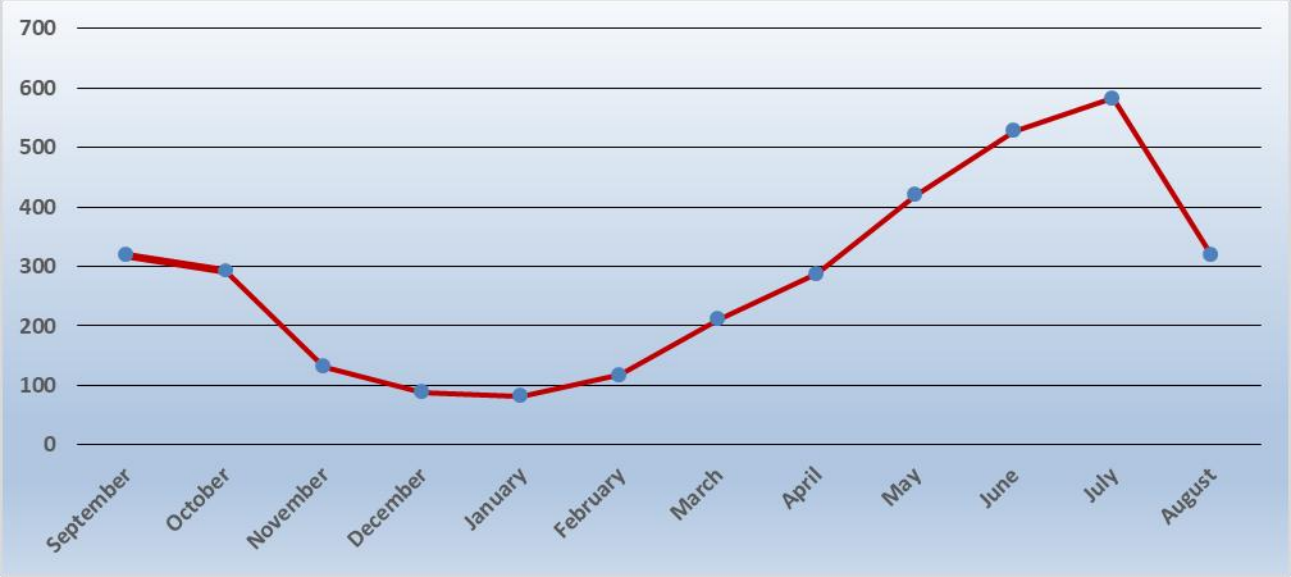
Month	Evaporation(mm)	Month	Evaporation(mm)
September	318.6	March	211.5
October	293.2	April	287.3

November	131.7	May	420.4
December	88.5	June	528.1
January	82.2	July	583.1
February	117	August	318.6

Source // Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Water Signals Department, unpublished data.

shape (4)

Monthly rates of evaporation (mm) for Samawa station for the period (2010-2020)



Source/Table (4)

5- Rain:

It is evident from Table (5) and Figure (5) that the highest average of the monthly totals of rainfall amounted to (24.7) mm during the month of December, while there is no rain during the summer months of June, July and August, and the annual total amounted to (97.43) mm.

table(5)

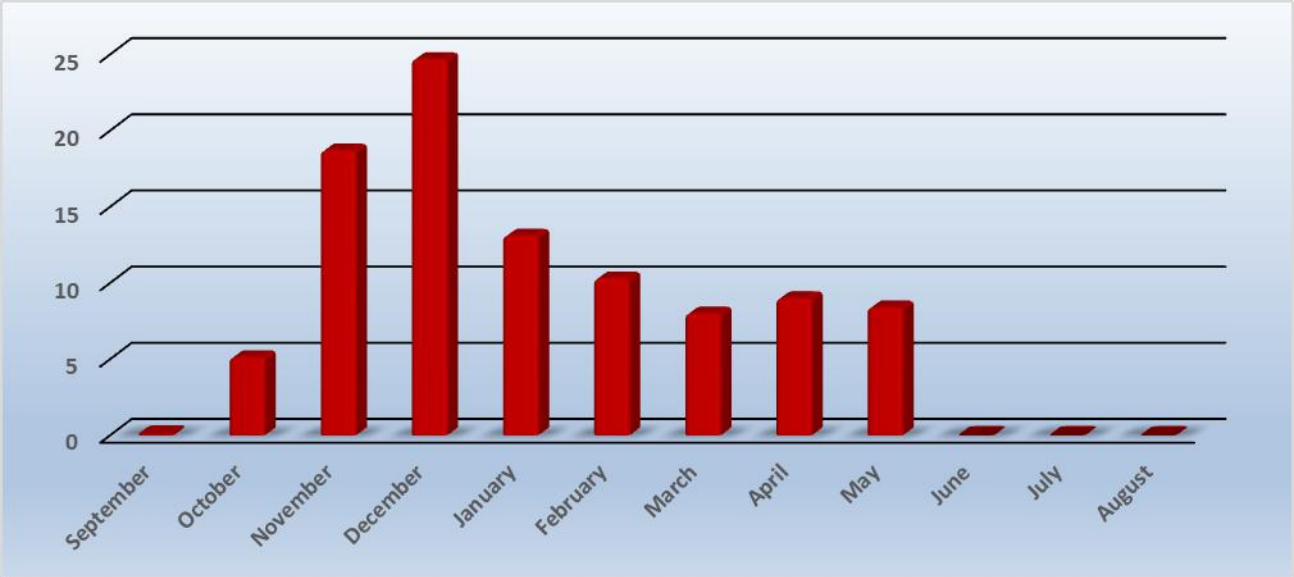
Average monthly totals of rain (mm) for Samawa station for the period (2010-2020)

Month	Rain (mm)	Month	Rain (mm))
September	0.1	March	8
October	5.127	April	9
November	18.7	May	8.4
December	24.7	June	0
January	13.1	July	0
February	10.3	August	0

Source // Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Water Signals Department, unpublished data.

shape (5)

Average monthly totals of rain (mm) for Samawa station for the period (2010-2020)



Source/Table (5)

6- Meteorological phenomena

Through Table (6) and Figure (6), the monthly rates of dust storms recorded the highest rate during the month of May, with a limit of (26), while the lowest rate reached (0) during the month of May, and the annual rate reached (10.08).

Table (6)

Monthly averages of the number of days of dust storms for Samawa station for the period (2010-2020)

Month	Number of dust storms	Month	Number of dust storms
September	2	March	20
October	5	April	25
November	1	May	26
December	1	June	15
January	3	July	8
February	15	August	0

Source // Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Division, unpublished data.

shape (6)

Monthly averages of the number of days of dust storms for Samawa station for the period (2010-2020)

Source/Table (6)

Fifth topic

Calculating the effect of climate on the comfort of the tourist according to the applied equations

The researchers were interested in providing three basic climatic factors in order to evaluate and estimate the value of the tourist climate or the ability of the climate to attract tourists (temperature, solar radiation, and rain). The researchers used these three components in their calculations to explain the scientific word for classifying the tourism climate as sunny. This is a temperate climate, characterized by warm, humid, sunny winters and mild, sunny summers or a pleasant setting.

The most important attempts to calculate such a site were made by Poulter, Fergusson, Rackliff and Hughes in their equations below, and respectively ([17]) :

IK = 10T + (S / 6) - (R / 5) Poulter
IK = 10TX + (S / 6) - (R / 3) Fergusson
IK = 4T + (S / 13) -2R[I] Rackliff
IK = TX + (S / 22) - (RD / 5) Hughes
Io = 20 S -7Rh+T Daifiss

whereas :-

IK - Guide to summer average temperature (June - July - August)
T = mean temperature centigrade
TX = daily average temperature
S = total hours of sunshine

[17] - Ali Abdul-Zahra Al-Waeli, The Origins of Applied Manakh, Ahmed Al-Dabbagh Press, Baghdad, 2014, p.234.

s = daily average solar brightness
R = total rain – mm
RI = Total Rain – Ing
RD = total of rainy days
Rh = total relative humidity
Io = Summer Tourism Guide

Looking at these equations, we can see that the temperature is added to the solar radiation minus the rain, which means that the value of the guide rises the more warm and sunny the site is with little rain, the higher the value of the tourist climate and vice versa, the more rain, the lower the heat and solar radiation are The value of the directory and the conversion of the site to the gallery and vice versa.

These equations were used to evaluate the tourist climate in a natural European environment, but a natural environment such as Iraq, the Arab world and most of the dry and semi-arid regions of the world reject this logic for the simple reason that the sun becomes a hindrance to human activity outside the environment, as the person tends to stay in his home as a result to sunlight.

As a result, the combination of sunlight and heat to determine a specific guide value is impossible. Rather, it is a tourist site in which the air temperature drops as much as possible, as in heights and under the shade, and for the purpose of the human body performing its natural activities in an atmosphere compatible with these activities without harming them, as most people are affected by high or low temperatures, humidity, And solar radiation, etc., is just the opposite, because these factors are interrelated, none of which can be an adequate indicator of a feeling of well-being. As a result, the only way to determine Iraq's comfort zones is by using Thom's study, which is evidence of temperature and humidity given the following equation:

$$THI = T - (0.55 - 0.55h)(T - 58)$$

whereas:

T: dry temperature (F), h: relative humidity (%)

Using temperature (C) instead of Fahrenheit, the relationship is:

$$THI(DI) = T - 0.55(I - h)(T - 14.5)$$

And (Thome) discovered as shown in Table (7) that if the relative humidity index for the temperature is less than (21) then all the population feels comfortable, and if the index is between (21-24), the number of people is uncomfortable, as it approaches (50) %). of people are uncomfortable when context values are (24), and discomfort increases when context values are between (24-27), ([18]).

Table (7)

The digital guide to Thome's context and expressing whether people feel comfortable or not

TH values	comfort type
less than 10	very upset
10-14.9	moderate discomfort
15-17.9	relative comfort (warm)

[18] - Ali Hassan Musa, The Biological Climate, Damascus, 2002, p. 58.

18-20.9	comfort
21-23.9	Relative comfort (10% - 50%) of individuals feel discomfort
24-26.9	Moderate discomfort (100%) of discomfort at a value of 26
27-29	I got so annoyed
more than 29	Great stress and dangerous to the health of individuals

Source / Ali Abdul-Zahra Al-Waeli, The Origins of Applied Manakh, Ahmed Al-Dabbagh Press, Baghdad, 2014, p. 203.

Since the influence of wind on these two components is not underestimated due to underestimation of comfort, the limits of comfort should not be separated from wind amplitude because the feeling of comfort at a given temperature and humidity varies quite with different wind velocities at a site. As a consequence, the separation of the comfort zones will depend on the evidence of heat and humidity, as well as the dependence of the cooling capacity of the wind, as stated by Possel Siple in 1954, using the following equation:

$$Ko = \sqrt{100}\ V + 10.45 - V\ (\ 33\ ^\circ - Ta\ )$$

whereas:

Ko = the capacity of the wind to cool, measured in kilocalories / m 2 h

V = wind speed in m/s

Ta = Celsius dry air temperature

33 = normal body temperature (naked parts)

The reason for this is that this equation calculates the ability of the Earth's surface to absorb the amount of heat within one square meter on the one hand, and the previous equations relate only to two climatic elements, temperature and humidity, so the wind must enter an element to calculate its impact on the other hand. Table (8) shows the internationally accepted ranges based on the wind cooling equation in order to provide physiological comfort.

Table (8)

The digital guide to the equation of wind cooling and determining the tourist climate and a sense of comfort

The result of applying the equation	Degree of comfort	Supplement the result of the equation	Degree of comfort
less than (50)	hot	800-1000	very cold (very cold)
50-100	warm	1000-1200	Freezing cold
100-200	refreshing (nice)	1200-1400	Freezing of exposed parts of the skin
200-400	cold	1400-2000	Freeze exposed parts in 1 minute
400-600	tend to be cold	more than 2000	Unbearable
600-800	Freezing cold		

Source: Ali Ahmed Ghanem, Applied Climate, 1st Edition, Dar Al Masirah for Publishing, Distribution and Printing, Amman 2010, p. 73.

1- Applied framework for the equation of wind cooling and whether the tourist feels comfortable or not:-

It is evident from Table (9) and Figure (7) and based on Table (8) that the monthly values of the index of human feeling of comfort according to the equation of wind cooling tended to be cold during the month (December, January and February), and the maximum value of the index was 538 during January due to the decrease in the monthly average temperature, reaching (11.75) degrees Celsius, which coincides with the high wind speed, which reached (3.3) m/s. The lack of tourists to the study area, while it becomes clear during the month (March and November) it tends to be cold, as the value of the guide reached (345) during the month of November due to the decrease in the monthly average temperature, as it reached (11.75) degrees Celsius, which coincides with the high speed The wind reached (3.3) m/s, while during the months (April and October), which is considered one of the comfortable months for the tourist in his feeling that the climate during these two months is refreshing, as the values of the guide ranged between (196-129) due to the temperature range between (25.5 - 25.5) 27.85 degrees Celsius, and the wind speed is between (3.8-3.1) m/s, respectively, during For the month of April and October, the uncomfortable and hot months were represented in the months (June, July, August and September), as the index values ranged between (-106 - -1) respectively during the month of July and September due to the high temperature, as it ranged between (37-33.05 degrees Celsius and wind speed between (4.3-3.2) respectively during the months (July and September), which results in a decrease in the number of tourists due to their being affected by the high temperature, which causes health problems such as heat stroke and heat, while representing the feeling of the tourist that The climate is warm during the month of May, as the index value reached (24), as the temperature reached (32.1) degrees Celsius and the wind speed (3.9) m/s, and this gives the tourist a feeling of warmth.

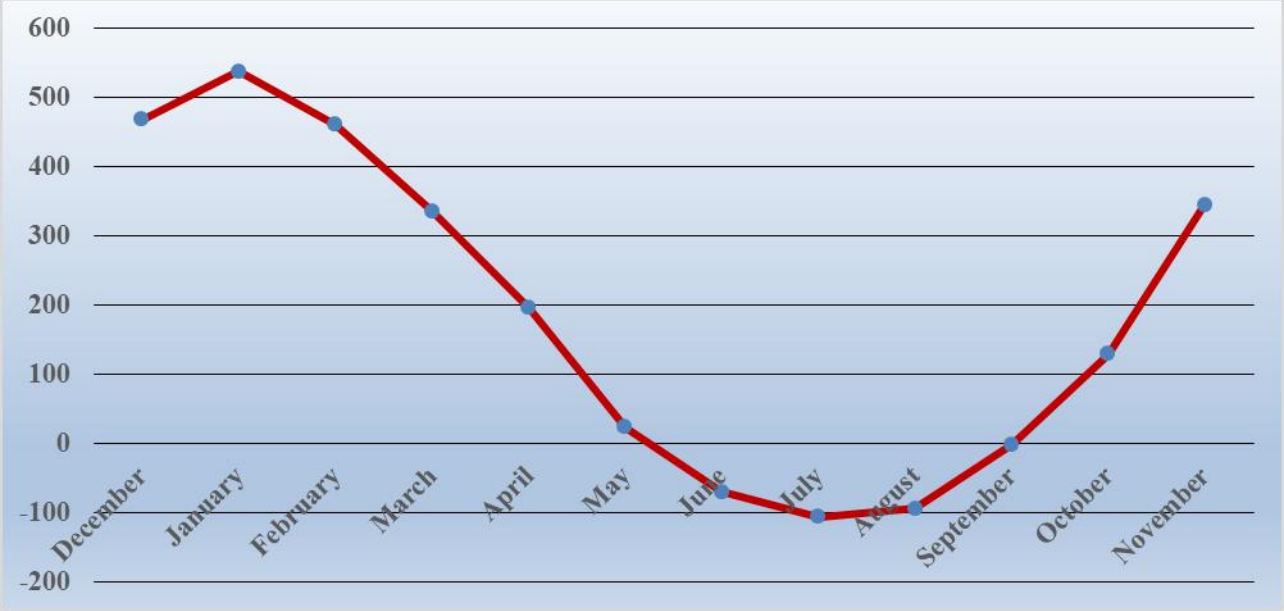
Table (9)

Monthly values of the index of human feeling of comfort according to the equation of wind cooling

Month	Temperature	Wind speed	Directory value	The feeling of the tourist according to the climate
December	13.9	2.9	469	tend to be cold
January	11.75	3.3	538	tend to be cold
February	15.05	3.5	461	tend to be cold
March	20.15	3.8	336	cold
April	25.5	3.8	196	refreshing
May	32.1	3.9	24	warm
June	35.6	4.3	70-	hot
July	37	4	106-	hot
August	36.7	3.3	94-	hot
September	33.05	3.2	1-	hot
October	27.85	3.1	129	refreshing
November	18.75	2.7	345	cold

Source // researcher's work based on
- Table (1), Table (2) and Table (8)

shape (7)
Monthly values of the index of human feeling of comfort according to the equation of wind cooling



Source / researcher's work based on table (9)

2- The practical framework of the presumption of Thome and the tourist's feeling of comfort or lack thereof:-

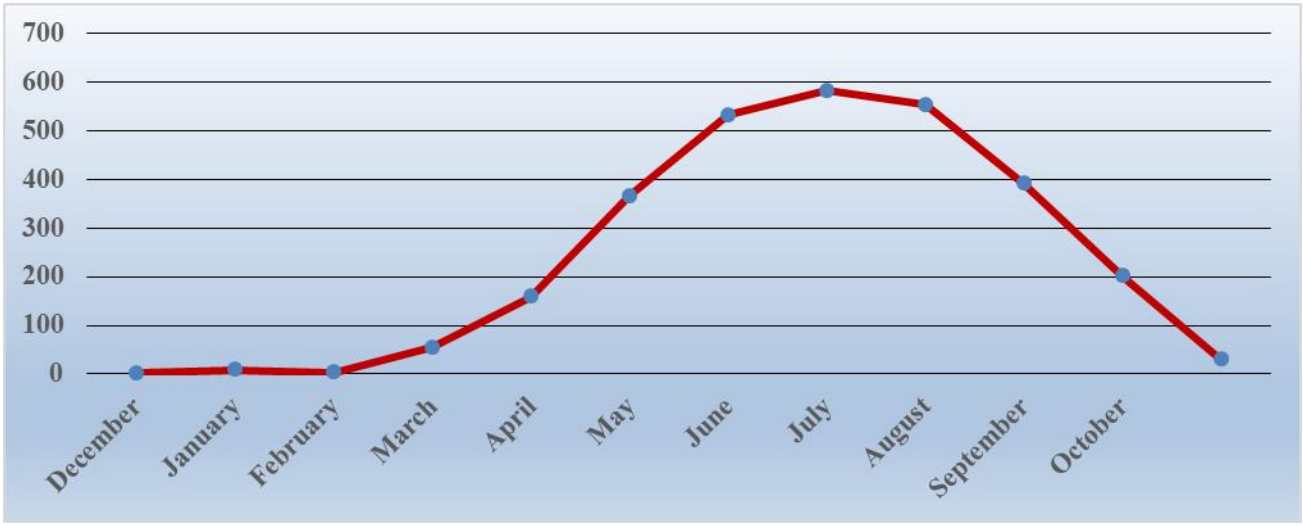
It is evident from Table (9) and Figure (7) and based on the values of the evidence in Table (7) that the values of the Thome presumption of whether or not a person feels comfortable was during the months (December, January and February) severe discomfort, as the values of the evidence ranged between (2.24-3.11)) respectively during the month of December and February as a result of the cold weather at a temperature ranging between (11.75-15.05) degrees Celsius and a relative humidity of (55.7%-46.7%), respectively during the months of January and February, while the months of (March - November)) People felt great and dangerous stress as a result of the index values ranging between (582.29-29.39) respectively during the months of July and November, due to the high temperatures and low relative humidity, as the temperatures ranged between (18.75-37) degrees Celsius, respectively during the months of November And July, and relative humidity (17.5-50%), respectively during the months of July and November, and from this it appears that the number of uncomfortable months affects the health and comfort of the person, whether by low temperatures during the winter months or high temperatures and low relative humidity during the end months Spring, summer and the beginning of the fall season meet .

Table (10)
Thome's monthly values for whether or not a person feels comfortable

Month	Temperature	Relative humidity	Presumption value Thome	The type of tourist rest according to the climate
December	13.9	52.7	2.24	very upset
January	11.75	55.7	8.32	very upset
February	15.05	46.7	3.11	very upset
March	20.15	36.1	54.26	Great stress and dangerous to the health of individuals
April	25.5	30.2	159.18	Great stress and dangerous to the health of individuals
May	32.1	22.5	366.48	Great stress and dangerous to the health of individuals
June	35.6	18.1	532.48	Great stress and dangerous to the health of individuals
July	37	17.5	582.29	Great stress and dangerous to the health of individuals
August	36.7	19	553.75	Great stress and dangerous to the health of individuals
September	33.05	27.1	391.87	Great stress and dangerous to the health of individuals
October	27.85	35.4	200.45	Great stress and dangerous to the health of individuals
November	18.75	50	29.39	Great stress and dangerous to the health of individuals

Source / researcher's work based on:
Table (1), Table (3) and Table (7)

shape (8)
Monthly values for Thome for a person to feel comfortable or not



Source/Table(10)

Conclusions:

1- It became clear through the research that there is a large variation in the rates of temperature, wind speed and humidity during the study period, which would affect the health and comfort of the tourist.

2- It was found that the months in which the tourist feels comfortable in the study area through the application of the wind cooling guide were determined by the months (April and October), which are considered among the most comfortable months for the tourist to feel comfortable, as the climate during these two months is refreshing, as the values of the guide ranged between (196- 129) due to the temperature ranged between (25.5-27.85) degrees Celsius and the wind speed between (3.8-3.1) m/s, respectively, during the month of April and October.

3- The months (December, January and February) are considered uncomfortable for the tourist because the monthly values of the index of human feeling of comfort according to the equation of wind cooling tended to be cold during a month, and the maximum value of the evidence was up to 538 during the month of January due to the decrease in the monthly average temperature As it reached (11.75) degrees Celsius, which coincides with the high wind speed, which reached (3.3) m/s, and this gives the tourist the feeling that the weather is cold, which does not comply with the requirements of the human body

4- It was found that the most famous months (December, January and February) were very disturbing by applying the Thome presumption during, as the values of the evidence ranged between (2.24-3.11) respectively during the month of December and February as a result of the cold air at a temperature that ranged between (11.75 - 15.05 degrees Celsius and relative humidity reached (55.7%-46.7%) respectively during the months of January and February. As for the months from (March - November), people felt great and dangerous stress as a result of the evidence values ranging between (582.29-29.39) on the respectively during the months of July and November.

Suggestions:

1- Paying attention to studies in the field of applied climate that determine the appropriate months for the tourist to feel comfortable to travel or picnic without pressures affecting his health and comfort.

2- Focus on understanding how a person can adapt to high temperatures and humidity, which are used to maintain one's health and provide comfort.

3- Emphasizing the necessity of adequate ventilation in both closed and open areas, which can make a person feel comfortable or uncomfortable depending on the presence of low or high temperatures.

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